इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 2801 (1967): Accuracy requirements for bulk meters used in petroleum trade [PGD 26: Weights and Measures]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

IS : 2801 - 1967
REAFFIRMED

Indian Standard

ACCURACY REQUIREMENTS FOR BULK METERS USED IN PETROLEUM TRADE

UDC 681·121 : 629·119·5 : 681·2·089

© *Copyright* 1968

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 1

Price Rs [illegible] Gr 2 *February* 1968

Indian Standard

ACCURACY REQUIREMENTS FOR BULK METERS USED IN PETROLEUM TRADE

Commercial Weights and Measures Sectional Committee, EDC 41

Chairman	*Representing*
DR A. R. VERMA	National Physical Laboratory (CSIR), New Delhi
Members	
SHRI BALMUKAND BALLA	Agra Iron Founders' Association, Agra
MAJ A. S. DAVE	Ministry of Defence (R & D)
MAJ N. P. BHATNAGAR (*Alternate*)	
SHRI B. R. DHURANDHAR	Saple's Scales Manufacturing Co Private Ltd, Bombay
SHRI A. GHOSH	National Test House, Calcutta
SHRI H. C. GULATI	Directorate General of Supplies & Disposals (Ministry of Supply, Technical Development & Materials Planning)
SHRI R. S. GUPTA	The Technical Corporation Private Ltd, Lucknow
SHRI P. N. KAUL (*Alternate*)	
SHRI G. R. D. HARPER	The Avery Co of India Private Ltd, Calcutta; *and* The Bengal Chamber of Commerce and Industry, Calcutta
SHRI W. J. SHEPHERD (*Alternate*)	The Bengal Chamber of Commerce and Industry Calcutta
SHRI C. K. HAZARI	Federation of Indian Chambers of Commerce and Industry, New Delhi
JOINT DIRECTOR, MECHANICAL ENGINEERING (METRIC)	Railway Board (Ministry of Railways)
SHRI B. N. MISHRA (*Alternate*)	
SHRI V. J. JOSHI	India Government Mint (Ministry of Finance)
SHRI SYED AHMED KHAN	States Controllers of Weights & Measures
SHRI H. C. KINRA	Burmah-Shell Oil Storage and Distributing Co of India Ltd, Bombay
SHRI C. S. R. ULLAL (*Alternate*)	
SHRI A. R. A. KRISHNAN	Ministry of Defence (DGI)
SHRI V. B. MAINKAR	Directorate of Weights & Measures (Ministry of Commerce)
SHRI A. P. MASSAND	Directorate General of Posts and Telegraphs (Department of Communications)
SHRI A. JHA (*Alternate*)	

(*Continued on page* 2)

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 1

(*Continued from page* 1)

Members	*Representing*
Shri H. L. Mehandru	States Controllers of Weights and Measures
Shri Jayendra A. Mehta	The Bombay Bullion Association Ltd, Bombay
Shri Venilal Thakorlal Sheth (*Alternate*)	
Shri A. K. Mukhopadhyay	George Salter India Ltd, Calcutta
Shri H. K. Mulchandani	Indian Institute of Petroleum (CSIR), New Delhi
Shri V. M. Pednekar	In personal capacity (*6 Nowroji Vakil Street, Grant Road, Bombay 7*)
Shri Prem Prakash	National Physical Laboratory (CSIR), New Delhi
Shri C. Narayana Rao	The Andhra Scientific Co Ltd, Masulipatam
Shri K. Srinivasa Rao	Directorate General of Technical Development (Ministry of Industry & Supply)
Shri T. K. Singaram	The Southern India Chamber of Commerce, Madras
Shri G. D. Thakoor	The Oriental Metal Pressing Works Private Ltd, Bombay
Shri J. E. Yorke (*Alternate*)	
Shri P. K. Tikku	India Government Mint (Ministry of Finance)
Shri D. C. Mukherjee (*Alternate*)	
Shri M. V. Patankar, Director (Mech Engg) (*Secretary*)	Director General, ISI (*Ex-officio Member*)

Commercial Measuring Instruments in the Petroleum Industry Subcommittee, EDC 41 : 6

Convener	
Shri H. K. Mulchandani	Indian Institute of Petroleum (CSIR), New Delhi

Members	
Shri A. D. Tuteja (*Alternate* to Shri H. K. Mulchandani)	
Shri G. R. D. Harper	The Avery Co of India Private Ltd, Calcutta
Shri H. C. Kinra	Burmah-Shell Oil Storage and Distributing Co of India Ltd, Bombay
Shri C. S. R. Ullal (*Alternate*)	
Shri V. B. Mainkar	Directorate of Weights & Measures (Ministry of of Commerce)
Shri H. L. Mehandru	Controller of Weights & Measures, Delhi
Shri M. V. Pandit	Industries and Labour Department, Government of Maharashtra
Shri C. M. Pavri	Caltex (India) Ltd, Bombay
Shri S. R. Khastgir (*Alternate*)	
Shri M. P. Wagh	Larsen & Toubro Ltd, Bombay

Indian Standard

ACCURACY REQUIREMENTS FOR BULK METERS USED IN PETROLEUM TRADE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 31 March 1967, after the draft finalized by the Commercial Weights and Measures Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 At the instance of the Standing Metric Committee (now the Directorate of Weights & Measures), Government of India, a number of Indian Standards on testing of accuracy of commercial measuring instruments used in petroleum trade are being prepared by the Institution. This standard covers the accuracy requirements and test requirements of the bulk meters used in petroleum trade. Besides, the series of standards for accuracy of commercial measuring instruments at present comprises the following:

IS: 3032-1965 General requirements for testing the accuracy of commercial measuring instruments used in petroleum trade

IS: 3033-1965 Accuracy requirements for dispensing pumps used in petroleum trade

IS: 3047-1965 Accuracy requirements for volumetric container filling machines used in petroleum trade

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS: 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the accuracy requirements for bulk meters used in petroleum trade.

1.1.1 Bulk meters shall not have a capacity below 100 litres.

---

*Rules for rounding off numerical values (*revised*).

2. DEFINITIONS

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Pressure Drop — The difference between the inlet and outlet pressures of the meter and is the pressure required to force liquid through the meter and overcome its resistance to movement.

2.2 Hydraulic Slip or Slippage — That quantity of liquid which passes through the meter without causing any registration.

2.3 Flow Range — That portion of the meter's total flow capacity in which it operates to meet the required degree of accuracy in measurement.

3. TYPES AND CONSTRUCTION

3.1 Bulk meters shall comply with IS: 3032-1965*. In addition, they shall conform with the requirements given in **3.3** to **3.5**.

3.2 Bulk meters used for measuring liquid petroleum products shall be positive displacement meters in which the liquid under a positive pressure head causes the measuring elements in the meter to rotate, reciprocate or otherwise move through a defined volumetric displacement before the liquid passes from the meter. This movement is interpreted through a train of gears on a register as a measure of liquid volume.

3.3 Meters differ widely in construction, but in general they may be divided into the following two main classes:

a) *Capillary Seal Meter* — Capillary seal meters which may either be of reciprocating, rotary or other types are sealed with a thin film of the liquid being measured and are usually characterized by a relatively low pressure-drop.

b) *'Packed' or Mechanical Seal Meter* — 'Packed' or mechanical seal meters are always of the reciprocating piston type and are sealed by a suitably designed piston ring or washer to prevent 'slip' or leakage of liquid. They have a higher pressure-drop than capillary seal meters.

3.3.1 Capillary seal meters are generally preferable for installation where gravity discharge is essential; both 'packed' and capillary seal meters are suitable for pressure discharge.

3.4 Meters are usually constructed of aluminium, aluminium alloys, bronze, brass or gun metal and stainless or special steels for certain small components. Carbon bearings and carbon vanes are also used since they operate satisfactorily without lubrication.

---

*General requirements for testing the accuracy of commercial measuring instruments used in petroleum trade.

3.5 Meters are sometimes fitted with automatically or manually operated temperature compensating devices. These devices correct the expansion or contraction of the liquid being measured with change of temperature and directly indicate the volume which the liquid would occupy at a standard temperature. The devices are satisfactory when the liquid temperature remains substantially constant, but when marked fluctuations in temperature occur, they should be used for accurate measurement only when their response to temperature change is very rapid.

4. METER INSTALLATION

4.1 The installation of the meter has a direct bearing upon its operation and such characteristics as the rate of flow and accuracy may be seriously affected if it is not correctly installed. It is, therefore, essential that where possible the layout be based on the following:

a) Meters should be protected by a strainer or filter and an air eliminator fitted as close to the inlet as possible so as to remove all particles which are injurious to the meter and which might impair its accuracy. They shall not be at a lower level.

b) The pipe work should be so arranged that the strainer, air separator and meter cannot be accidentally drained.

c) All pipe work and fittings shall be cleaned and flushed out to remove scale and foreign matter before installing the meter.

d) The meter shall be mounted securely on a horizontal base using rubber mounting pads to reduce shock and vibration where these are likely to occur.

e) Inlet and outlet pipe work should not exercise a strain on the meter body. Acute bends, tees and elbows shall be avoided as far as possible.

f) The layout shall be so designed as to facilitate removal of the meter without unneccessarily disturbing the pipe work and sufficient space shall be provided to allow for meter calibration, cleaning and small servicing requirements.

g) If pipe jointing compounds are used, these shall be applied to the male parts, not to female. It is vital not to allow any compound to enter the meter.

h) The meter shall be located so that the resigter is clearly readable by the operator from the control point.

j) Flow control valves, when fitted, shall be installed adjacent to the outlet of the meter. If a valve is installed on the inlet side, it should be located at a sufficient distance on the upstream side to ensure a uniform steady flow through the meter when the valve is throttled.

k) Pulsating flow, such as that caused by piston pumps, shall be avoided; if this is not possible to achieve, a surge tank or alleviator should be installed upstream of the meter(s).

m) Meters shall not be installed on the suction side of pumps.

5. TESTS

5.1 All meters shall be tested for accuracy of discharge as described in **5.1.1** to **5.1.3**.

5.1.1 All meters shall be tested under conditions which duplicate normal operating conditions as closely as possible particularly in respect of rates of flow and the product involved.

5.1.2 Before commencing checking of a meter, the meter should be run for several minutes to ensure that all units are functioning smoothly.

5.1.3 For testing of meters, a proving tank shall be used. The capacity of the proving tank shall be sufficient in size to contain at least one minute's flow through the meter at its normal operating rate when used for bulk loading.

5.2 The procedure for testing shall be as follows:

a) After all connections have been made the proving tank of a verified capacity shall be filled once with the full quantity in order to wet all surfaces, to fill the discharge hose and to prove that there are no leaks in the connection;

b) The proving tank shall then be emptied and the outlet valve shall be closed after it is completely drained;

c) Set the meter dial to zero reading;

d) Fill the proving tank through the meter to a point where the meter dial records the capacity of the proving tank. If the meter is fitted with an automatic presetting device, this should be set to deliver the capacity of the proving tank;

e) Note the reading on the graduated gauge glass of the proving tank, which would show that the meter is:

   1) within the permissible error, or

   2) beyond the permissible error;

f) If (e)(2) be the case, adjust the meter until the errors are brought within the permissible error prescribed under **5.3**;

g) Repeat steps (b), (c), (d) and (e) until the meter gives two consecutive deliveries within the permissible error; and

h) If the meter has been found to give accurate measure in the initial test itself, make a further test to check the accuracy recorded.

5.3 Permissible Error — The permissible errors shall not exceed ±0·1 percent for any quantity discharged.

5.4 The bulk meter shall be complete with all parts and attachments concerned with the operation of measurement and delivery.

INDIAN STANDARDS INSTITUTION

The Indian Standards Institution (ISI), which started functioning in 1947, is the national standards organization for India. Its principal object is to prepare standards on national and international basis, and promote their general adoption.

The overall control of ISI, which is run and financed jointly as a non-profit making body by the Government and private enterprise, is exercised by the General Council, composed of representatives of Central and State Governments; leading trade, scientific and technological organizations; and subscribing members. The Union Minister of Industry is the ex-officio President of ISI.

The present technical activity of ISI is carried out through 8 Division Councils for Agricultural and Food Products; Chemical; Civil Engineering; Consumer Products; Electrotechnical; Mechanical Engineering; Structural and Metals; and Textile. All technical work relating to the formulation and revision of standards is done by committees appointed by and under the direction of their respective Division Councils. These committees consist of experts drawn from manufacturing units, technical institutions, purchase organizations and other concerned bodies.

To make available benefits of Indian Standards to the common man, ISI has introduced its Certification Marks Scheme under the *Indian Standards Institution (Certification Marks) Act, 1952*, as amended by the *Amendment Act, 1961*. According to this Act, quality goods conforming to Indian Standards can carry the ISI Certification Mark. This Mark is a third-party guarantee of quality of marked goods. Licences to use the ISI Certification Mark are granted to manufacturers using reliable methods of quality control subject to overall inspection by ISI.

In the international field, ISI represents India on the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). ISO and IEC respectively link 54 and 40 countries, and function through 118 and 58 technical committees; ISI participates in 83 technical committees of ISO and all the technical committees of IEC. The committees and subcommittees of IEC and ISO for which ISI holds the secretariat deal with: Electric Fans, Lac, Mica, Pictorial Markings for Handling of Goods, Liquid Flow Measurements in Open Channels, Procedures for Inter-conversion of Values, Spices and Condiments, and Stimulant Foods.

AMENDMENT NO. 1 SEPTEMBER 1997
TO
IS 2801 : 1967 ACCURACY REQUIREMENTS FOR BULK METERS USED IN PETROLEUM TRADE

(*Page* 7) — Insert the following new clauses at the end of the text:

'6 MEASURING ASSEMBLY CHARACTERISTICS

.1 The following characteristics of the measuring assembly shall be declared by he manufacturer:

a) Maximum flow rate;

b) Minimum flow rate;

c) Maximum operating pressure;

d) Minimum operating pressure, if necessary;

e) The liquids or liquid to be measured and the limits of kinematic or dynamic viscosity (where an indication of the nature of the liquids alone is not sufficient to characterize their viscosity);

f) Minimum delivery; and

g) Temperature range, when the liquid volume can be measured at a temperature below minus 10°C.'

(LM 06)

Reprography Unit, BIS, New Delhi, India

PUBLICATIONS OF INDIAN STANDARDS INSTITUTION

INDIAN STANDARDS

About 4 500 Indian Standards, broadly classified under the following main heads, have been issued so far:

- **Agriculture & Food**
- **Chemical**
- **Civil Engineering**
- **Consumer Products**
- **Electrotechnical**
- **Mechanical Engineering**
- **Structural & Metals**
- **Textile**

Of these, the standards belonging to the Mechanical Engineering Group fall under the following categories:

- Basic Engineering Standards
- Abrasives
- Air-Conditioning
- Bearings
- Bicycle Components
- Chemical Engineering
- Engineering Metrology
- Gas Cylinders and Fittings
- Gaskets and Packings
- Gears
- Hand Tools
- IC Engines and Automotive Vehicles
- Instruments (Drawing, Optical and Surveying)
- Machine Tools and Small Tools
- Marine Engineering and Shipbuilding
- Mechanical Handling, Lifting
- Pumps
- Refrigeration
- Sewing Machines
- Steam Tables
- Threaded Fasteners and Rivets
- Transmission Devices, Pulleys and Belts
- Weights and Measures
- Wire Ropes and Wire Products
- Unclassified

OTHER PUBLICATIONS

	Rs
ISI Bulletin (Published Every Month)	
Single Copy	2·00
Annual Subscription	15·00
Annual Reports (from 1948-49 Onwards)	2·00 to 3·00 each
Handbook of ISI Publications, 1967	5·00

Available from

INDIAN STANDARDS INSTITUTION

Headquarters

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 1

Telephones **27 36 11 - 20** Telegrams **Manaksanstha**

Branch Offices

Telegrams Manaksanstha

534 Sardar Vallabhbhai Patel Road	**Bombay 7**	**Telephone**	**35 70 27**
5 Chowringhee Approach	**Calcutta 13**	**„**	**23 - 1823**
Industrial Estate Administrative Building, Sanatnagar	**Hyderabad 18**	**„**	**3 92 29**
117/418 B Sarvodaya Nagar	**Kanpur**	**„**	**3 76 95**
54 General Patters Road	**Madras 2**	**„**	**8 72 78**

Printed at the Catholic Press, Ranchi, India